

Our ref: KON-1805

Client's ref: P-6166-001-0000

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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In re Application of: T. Takabayashi : Art Unit : 2853

Serial No. : 10/621,635 :

Examiner : M. S.

Filed : July 17, 2003 :

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Title : CONSERVATION METHOD OF :  
INK FOR INK-JET RECORDING  
AND IMAGE FORMING METHOD :

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**DECLARATION**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

S i r:

I, Toshiyuki Takabayashi, hereby declare and say as follows:

1. I am the sole inventor of the above-identified patent application.

2. I received a Bachelor's Degree in Chemistry from Kyoto University in March 1992. Since April 1992, I have been employed by Konica Corporation, the Assignee of the above-identified patent application. Currently, I am employed by Konica Minolta Medical & Graphic, Inc., the successor in interest to this application. During my employment at Konica and Konica Minolta, I have been engaged in research and development in the field of image forming materials.

3. I am aware that the Examiner has rejected a number of the claims of the above-identified patent application based on Maxwell (EP 0071345). Tests have been performed and are reported herein to demonstrate the difference between the ink-jet ink of this application and the ink-jet ink of Maxwell.

These tests also show the superior character quality obtained by the present invention. These tests have been performed either by myself or under my direct supervision and control.

4. The ink of Example 4 of Maxwell was prepared following the procedures in Example 4 of Maxwell and named Comparative Ink A. Comparative Ink A contained

volatile organic compounds. The composition of Comparative Ink A is as follows:

Table 1

Ink A (Maxwell Example 4)

		Pbw
Epoxy resin	Epon 825	15.2
	ERL 4221	8.1
	Epoxide 8	4.0
	ECN 1235	5.0
Solvent system	Methanol	22.7
	Methyl ethyl ketone	22.7
	Isopropanol	7.2
	Water	4.5
Other component	BDS photo initiator	9.0
	Sprit Soluble Fast violet RR	1.4
	FC 439	0.1
	Total	100

5. Inventive Ink B was prepared in the same manner as Comparative Ink A except that no volatile organic compounds were present. Inventive Ink B is considered to be representative of the ink of the present application. The composition of Inventive Ink B is as follows:

Table 2

Ink B (Comparative ink)

		Pbw
Epoxy resin	Epon 825	40.0
	ERL 4221	21.3
	Epoxide 8	10.5
	ECN 1235	13.1
Solvent system		
	Water	4.5
Other component	BDS photo initiator	9.0
	Sprit Soluble Fast violet RR	1.4
	FC 439	0.1
Total		100

6. Comparative Ink A and Inventive Ink B were stored for 2 weeks at 50 °C in a sealed polyethylene container. Comparative Ink A and Inventive Ink B were then jetted onto 4 different types of recording materials wherein

the ink and recording material combinations were named Condition Nos. 49-56 as shown in Table 3.

Table 3

Combination of Ink  
and Recording material

Condition No.	Ink	Recording materials
49	Ink A	OPP
50	Ink A	PET
51	Ink A	Shrink OPS
52	Ink A	Cast coat sheet
53	Ink B	OPP
54	Ink B	PET
55	Ink B	Shrink OPS
56	Ink B	Cast coat sheet

7. The same ink-jet apparatuses and same conditions were employed for the ink-jet processes of both inks, except that the viscosity of Inventive Ink B was adjusted to that of Comparative Ink A by increasing the temperature of the ink-jet head. Ink-jet images were produced under 3 different environments for each of Condition Nos. 49-56; (i) 10 °C and 20% RH; (ii) 25 °C and 50% RH; and (iii) 30 °C and 80% RH. A total of 24 total image samples were therefore obtained, 12 for Comparative Ink A and 12 for Inventive Ink B.

8. The 24 image samples were irradiated in the same manner as described in Table 5 at page 57 of the present application. The 24 cured images were then subjected to an evaluation of character quality as described at pages 60-62 of the present application. The results of this evaluation are illustrated in Table 4.

Table 4

Evaluation results: Character quality

Printing Conditions	10 °C 20% RH	25 °C 50% RH	32 °C 80% RH	Ink
49	C	C	C	Ink A
50	C	C	C	Ink A
51	C	C	C	Ink A
52	B	C	C	Ink A
53	A	A	B	Ink B
54	A	B	B	Ink B
55	B	B	B	Ink B
56	B	B	B	Ink B

9. As shown in Table 4, the image samples employing Inventive Ink B is different than and produced higher quality characters compared to the image samples employing Comparative Ink A in 11 out of the 12 comparison situations. For example, at 10°C and 20% RH when using the OPP recording material (Condition Nos. 49 and 53), roughness was observed (C) after jetting Comparative Ink A, while no roughness was observed (A) after jetting Inventive Ink B. The superior character quality of Inventive Ink B can be further seen when comparing Condition No. 49 with Condition No. 53 (OPP recording material) at 25°C and 50% RH, as well as at 32°C and 80% RH. In addition to the above, the superior character quality of Inventive Ink B can also be seen when comparing Condition No. 50 with Condition No. 54 (PET recording material) and Condition No. 51 with Condition No. 55 (shrink OPS recording material) at 10°C and 20% RH, at 25°C and 50% RH, as well as at 32°C and 80% RH. Finally, the superior character quality of Inventive Ink B can be seen when comparing Condition No. 52 and Condition No. 56 (cast coat sheet recording material) at 25°C and 50% RH, as well as at 32°C and 80% RH. Inventive Ink B therefore outperformed Comparative Ink A in 11 out

of the 12 environment condition/recording material combinations.

10. It is my belief that the above test data demonstrates that the preserved ink-jet ink of the present invention having no volatile organic compounds produces superior characters compared to the ink-jet ink of Maxwell. It is further my belief that one of skill in the art would find these results to be surprising and unexpected.

It is declared by undersigned that all statements made herein of undersigned's own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the U.S. Code; and that such willful false statements may jeopardize the validity of this Application or any patent issuing thereon.

Toshiyuki Takabayashi  
Toshiyuki Takabayashi

Dated: This 21<sup>st</sup> day of January, 2005.